DEFECT CHARACTERIZATION OF SILICON DENDRITIC WEB RIBBONS

JET PROPULSION LABORATORY

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* Etch Pit Distribution
* Cross—Section EBIC
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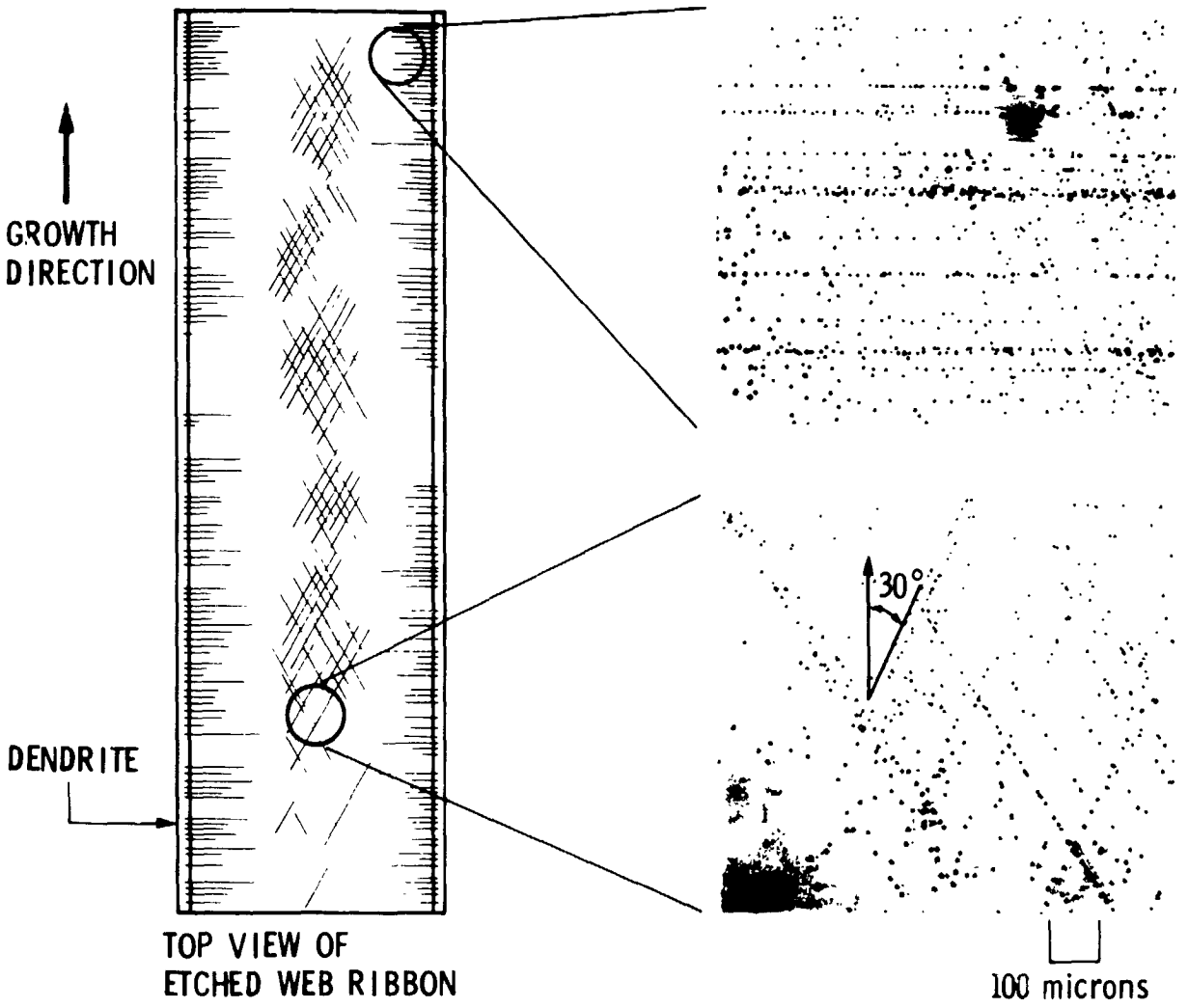
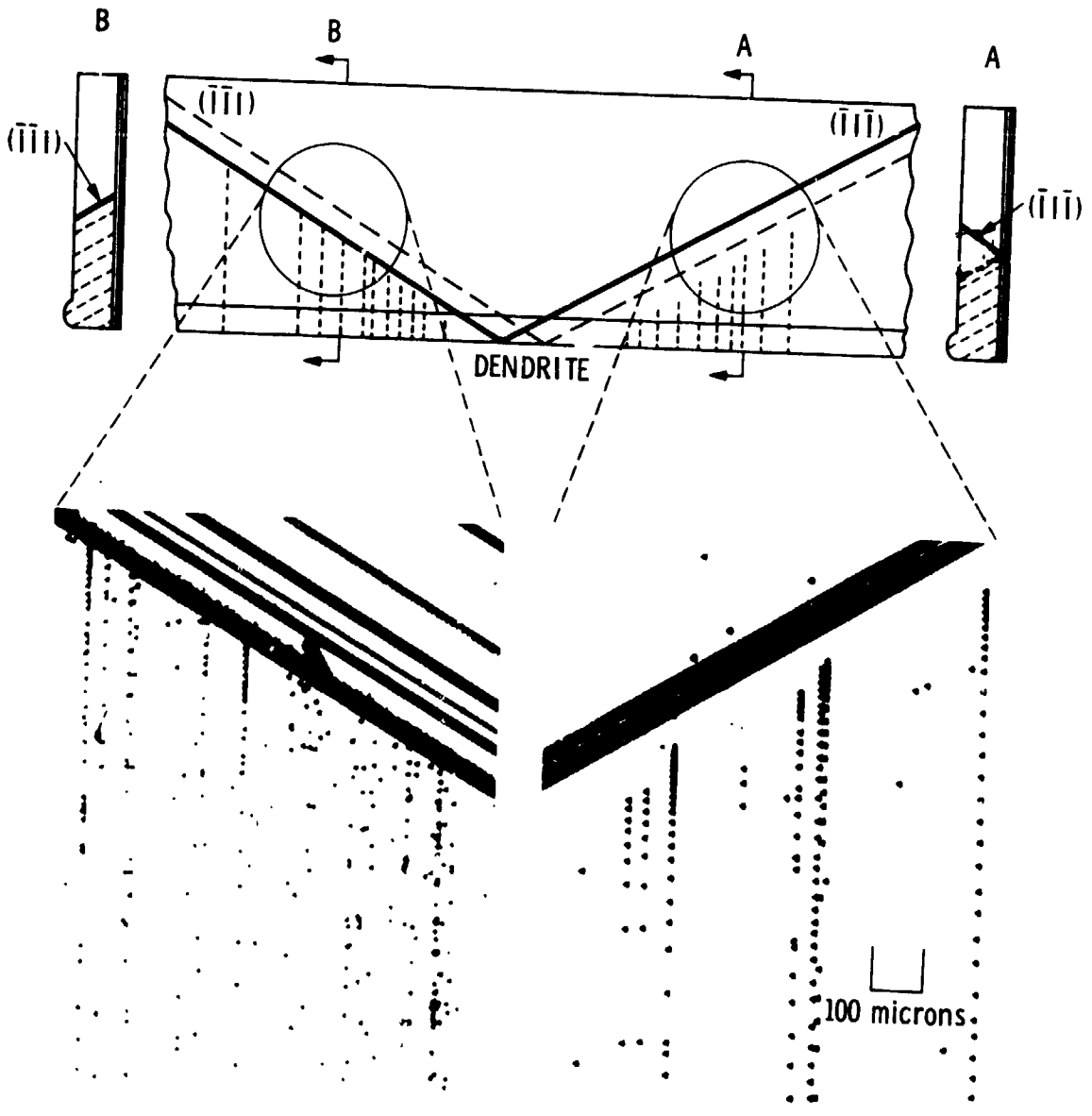


Patterns of Etch Pits on Web Ribbon Surface
Due to Dislocations

Possible Movement of Three Major Slip Planes Under Stress

NATURE OF STRESS	DIRECTION WITH RESPECT TO GROWTH AXIS	INTERCEPTS ON WEB SURFACE
TENSILE	PARALLEL, σ_{xx}	✳
	PERPENDICULAR, σ_{yy}	X
SHEAR	PARALLEL, σ_{yx}	X
	PERPENDICULAR, σ_{xy}	—

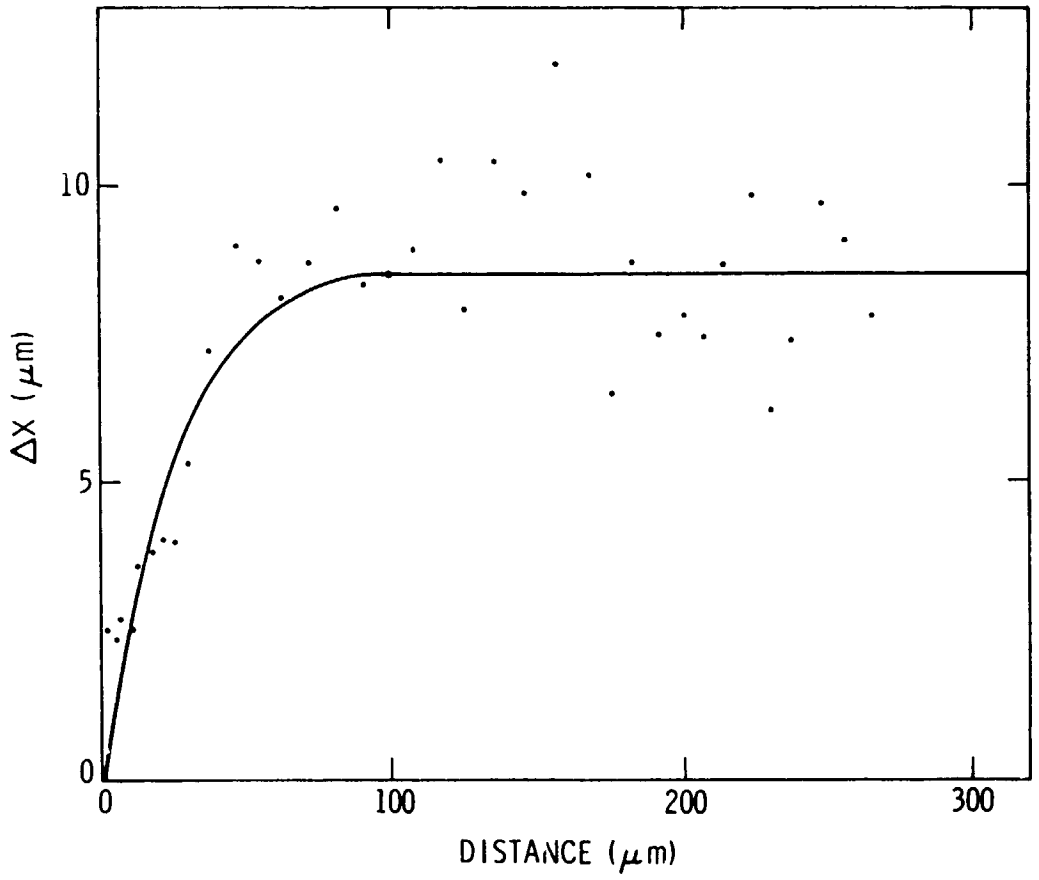


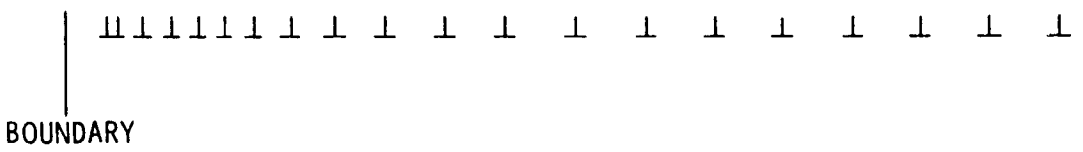
— INTERCEPTS OF $(\bar{1}\bar{1}1)$ AND $(\bar{1}1\bar{1})$ TWIN BOUNDARIES WITH THE RIBBON SURFACE

--- INTERCEPTS OF $(\bar{1}\bar{1}\bar{1})$ AND $(\bar{1}11)$ TWIN BOUNDARIES WITH THE TWIN PLANE

----- ETCH PIT LINES DUE TO SLIP DISLOCATIONS [101]

▬ THE TWIN PLANE IN THE CENTER OF THE RIBBON PARALLEL TO THE SURFACE





TOTAL STRESS ON THE FIRST DISLOCATION DUE TO THE PRESENCE OF NEIGHBORING DISLOCATIONS ALIGNING ALONG x DIRECTION

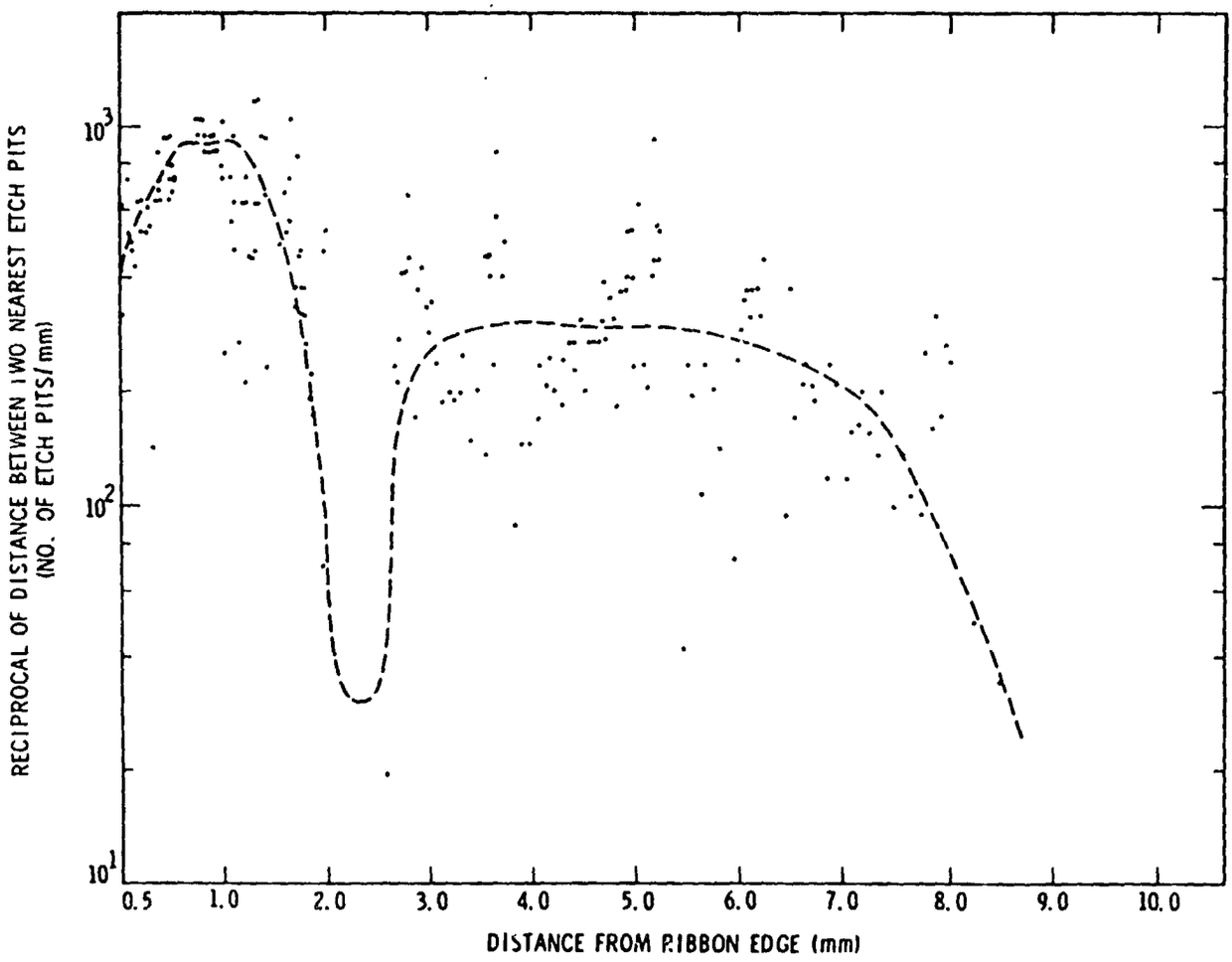
$$\sigma_{xy}^{tot} = \frac{\mu b}{2\pi(1-\gamma)} \sum_i \frac{1}{x}$$

EXPERIMENTAL DATA

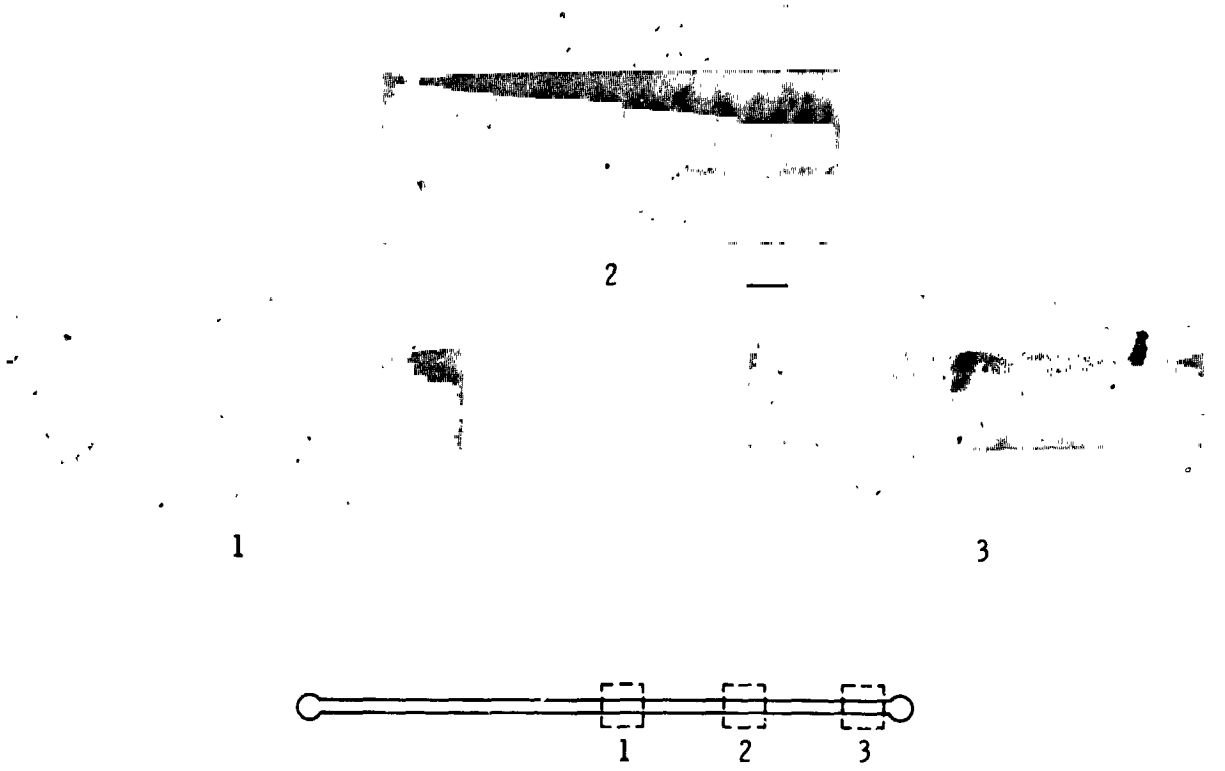
σ_{xy}^{tot} (AT THE PILEUP) = 1.07×10^8 dynes/cm^2 (1.55×10^3 PSI)

USING Y = 20 PSI

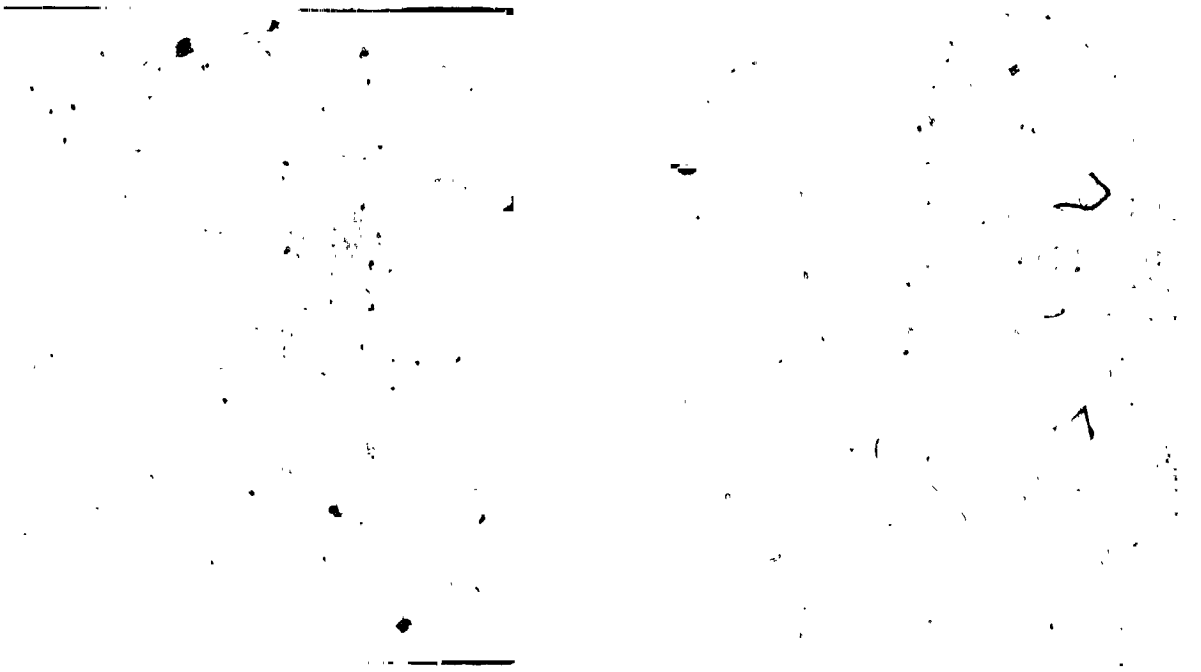
$$\mu = \frac{Y}{2(1-\gamma)} = 9.57 \times 10^{11} \text{ dynes/cm}^2$$


RECIPROCAL OF DISTANCE BETWEEN TWO NEAREST ETCH PITS
(NO. OF ETCH PITS/mm)
10^3
10^2
10^1
0.5
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
DISTANCE FROM RIBBON EDGE (mm)

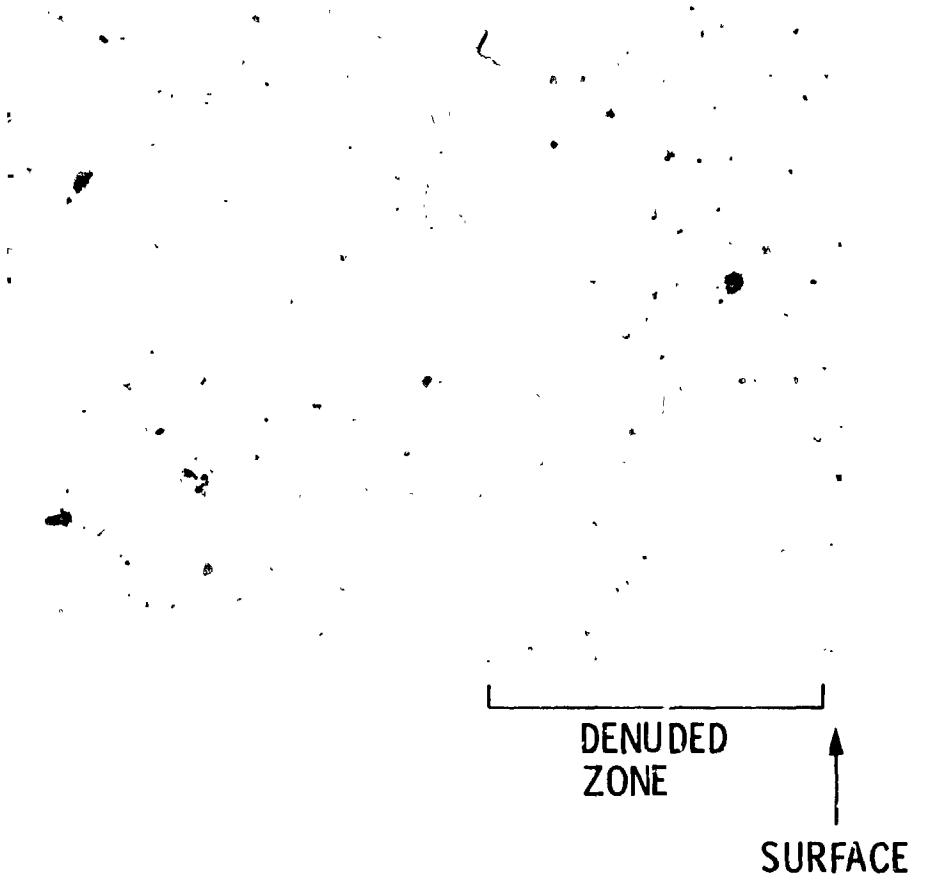
Cross-Section EBIC in As-Grown Web Ribbons (taken at room temperature)



Temperature Dependence of EBIC in Diffused Silicon Web Ribbon



SEM Picture of Etched Cross-Section of Silicon Web Ribbon



Effect of Diffusion